

COLD ARGON PLASMA TORCH FOR WATER TREATMENT

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The effects of water treatment by surface-wave-sustained plasma torch at 2.45 GHz are studied. Two aspects of the plasma–liquid interaction have been investigated: water physical and chemical characteristics as H₂O₂ concentration, conductivity and pH, are modified as a result of the plasma treatment and on the other hand the plasma properties are changed during the interaction with water.

The plasma torch is considered as plasma–air configuration. Working gas is Argon at atmospheric pressure. Gas flow rate varies from 0.1 l/min up to 3 l/min. Discharge conditions are: plasma radius from 0.5 mm to 1.5 mm; wave frequencies 2.45 GHz. Treatment time during all the investigations is significantly short – less than a minute and the input wave power is in the range from 12 W to 40 W.

The advantage of this type of discharge is the low operating gas temperature, since the H₂O₂ decomposition is strongly dependent on the temperature. The low gas temperature also allows plasma to be in close contact to the treated water without evaporation. Estimation of the changes in the characteristic concentration of hydrogen peroxide of plasma treated liquids is done.

Simultaneously, the plasma characteristics as plasma length and electron temperature are measured in the presence of water placed below the discharge and compared with the same characteristics when there is no water.

Creation and determining the H₂O₂ concentration is needed since the H₂O₂ is one of the most powerful oxidizers, able to destroy organic contaminates which are ordinarily difficult to destroy, as well as inactivating cells of living organisms. This is the reason why it plays a main role in various biological, biomedical, environmental and wastewater treatments.

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